

## Description

# PLASTIC BUILDING MATERIAL COMPONENTS

### BACKGROUND OF INVENTION

[0001] Traditionally, wood has been used as the primary structural and decorative component for fencing, decking and other applications. While wood has proven to be an acceptable material for these purposes, it does have drawbacks. Chief among these drawbacks includes the susceptibility to environmental degradation, such as weathering, ultra violet degradation, moisture and other damage. Also, wood is susceptible to rot, insects, fire and other types of damage. Frequent treatment, such as painting, staining, and other care is necessary to minimize the damage to wood products, particularly those used in outdoor applications.

[0002] Plastic components are now becoming more accepted as a substitute for wood components in these applications. These plastic components typically are formed from

polyvinyl chloride (PVC) or acrylonitrile butadiene styrene (ABS) polymers. These types of plastic do not have sufficient rigidity, so they are often formed with an aluminum or steel channel inside the component. These plastic components fail to achieve the aesthetics of the actual wood components and are either flimsy, or if reinforced with metallic components, are heavy and difficult to cut and install.

[0003] Another issue with the prior plastic components is their longevity and maintenance. Even though these components are formed from plastic, they still degrade over time and exposure to the environment. These materials do not have good cold weather characteristics, which can create costly repairs.

[0004] These prior plastic components also do not have the appearance of a traditional wood material. These plastic materials fail to provide the appearance and texture of a wood material. Attempts have been made to simulate wood grain by embossing or other mechanical treatments of the surface of the wood but these fail to provide a realistic wood grain appearance.

[0005] Another problem encountered with fencing and/or decking components is the difficulty in the installation pro-

cess. Most typical plastic components and even wood component fencing systems require professional installation. While there are modular or kit systems presently available, these tend to be awkward to install and even then do not provide the aesthetics of a wood fencing system.

## **SUMMARY OF INVENTION**

[0006] The present invention solves these problems and others by providing a process for producing a building material component that has the appearance of a wood material component. This allows the building material component to be used in applications that traditionally have used wooden components, such as pickets for picket and rail fences, decking and other uses.

[0007] The building material component of a preferred embodiment of the present invention is formed from a material that can be extruded into a desired shape, such as a picket, plank or other structural or decorative component. The material has the characteristics of being color and UV stable regardless of the exposure to the environment. In a preferred embodiment, polyethylene is used to provide these characteristics as well as exceptional cold weather impact strength.

[0008] The building material component of a preferred embodiment has texture on the outer surface to simulate that of a wood material. The texture is uniquely created during the extrusion process. An agent, such as a blowing agent, is added during the extrusion process having a different melt temperature than the base material. This causes the texture to be created in the plastic material.

[0009] Color streaking is also created during the extrusion process. Coloring agents are added during the extrusion process. The coloring agents have different melt temperatures or viscosities relative to one another and to the base material. This causes streaking to occur in the plastic material.

[0010] A uniquely designed extruder screw is used during the extrusion process to control the rates and dispersion of the streaking agents, the coloring agents and the base material. The use of this unique extruder screw forms the component in a unique fashion to provide a simulated wood product.

[0011] The building material component of the preferred embodiment of the present invention is extruded in the shape of a picket for use in a rail and picket fence assembly. The pickets, rails and posts are assembled through the use of

unique fastening mechanisms. The assembled fence has the appearance of a traditional wood fence without the required maintenance and upkeep of the wood fences.

[0012] These and other features of the present invention are evident from the ensuing detailed description of preferred embodiments and from the drawings.

#### **BRIEF DESCRIPTION OF DRAWINGS**

[0013] Figure 1 is a perspective illustration of a building material component of a preferred embodiment of the present invention.

[0014] Figure 2 is a cross-sectional view of the component of Figure 1.

[0015] Figure 3 is a schematic of a typical molding process.

[0016] Figure 4 is a side view of a preferred embodiment of an extruder screw for an profile extrusion machine for producing the component of Figure 1.

[0017] Figure 5 is a perspective view of a fencing assembly section of a preferred embodiment of the present invention.

[0018] Figure 6 is a detail view of the post and rail assembly of the embodiment of Figure 4.

[0019] Figure 7 is a detail view of the rail and post assembly of the embodiment of Figure 4.

[0020] Figure 8 is a view of the fastener of post and rail assembly of Figure 6.

[0021] Figure 9 is a view of the fastener of the rail and picket assembly of Figure 5.

#### **DETAILED DESCRIPTION**

[0022]

[0023]

[0024] The present invention, in a preferred embodiment, provides a plastic component system for use in fencing, skirting, barricading and other applications. The present invention also provides a fencing system as well. A preferred embodiment of the present invention is described below. It is to be expressly understood that this descriptive embodiment is provided for explanatory purposes only, and is not meant to unduly limit the scope of the present invention as set forth in the claims. Other embodiments of the present invention are considered to be within the scope of the claimed inventions, including not only those embodiments that would be within the scope of one skilled in the art, but also as encompassed in technology developed in the future.

[0025] The descriptive embodiments provided herein describe a

component system for use with fencing as well as other decorative applications. It is to be expressly understood that the components have application in many other uses beyond those described herein.

[0026] A preferred embodiment of the components of the preferred embodiment of the present invention is illustrated in Figure 1. The structural rail picket 10, shown in Figure 1, is extruded in a size and shape to be used for a rail fence. It is to be expressly understood that other sizes and shapes of structural and/or decorative components may be used as well under the preferred embodiment of the present invention. The rail picket described herein is intended for descriptive purposes only. The rail picket 10 is approximately 3/4 inch thick and four to six inches wide and six feet tall.

[0027] In this preferred embodiment, the picket rail 0 is extruded from a thermoplastic material. In this embodiment, the picket is extruded from polyethylene in a profile extrusion process. The use of polyethylene provides a component that is non-degradable and UV and color stable with exceptional cold weather characteristics. The component can be easily cleaned as well. There is little maintenance required once the component has been installed. The fenc-

ing system can be easily cleaned with soap and water. Numerous color pigments can be utilized in creating different colors of polyethylene products. In this preferred embodiment, the component is extruded from color pigments in a simulated wood coloration, such as redwood, cedar or other popular wood fencing products.

[0028] A unique feature of the preferred embodiment of the component is the texturing and coloring of the component. During the extrusion process, an agent is injected into the raw material to create a texturing effect on the surface of the picket or other component. The agent melts at a temperature different from the thermoplastic material in order to create the texture in the material. One type of agent that can be utilized is a blowing agent. Blowing agents are normally used to create cellular structure in foam plastics. The blowing agent decomposes or decompresses by heating to create a gas inside the base material to build up a cellular structure. In this embodiment, the blowing agent is used with polyethylene instead to create the textured effect on the surface of the material. Prior components having texturing are formed by embossing or otherwise mechanically treating the material to create the effect.



[0029] The textured surface 12 on the component 10 provides a realistic impression of a wood material. An additional feature that further enhances the appearance of the component 10 is the color streaking in the surface as well. Several streaks of color are provided in the surface of the component 10 to create an impression of wood grain, particularly in combination with the textured surface of the component as discussed above. The streaking in the surface is created in this preferred embodiment by injecting different coloring agents during the extrusion process. Each of the coloring agents has a different melt and/or viscosity. As the extrusion process occurs, the agents move through the molten material at different rates at different times to create the streaking effect.

[0030] In a preferred embodiment of the present invention, the picket or other building material component is able to be extruded having the above characteristics of streaking and texture by a novel profile extrusion process. A typical profile extrusion process is illustrated in Figure 3. The plastic base material is fed through hopper 102 in system 100 into a heated extruder tube. A reciprocating screw 110 transports the base material through the heated tube so to melt the base material. The plasticized material is

then fed into an extrusion die 104 to form the product. The present process uses a unique screw 120, shown in Figure 4, to feed the base material and the texturing and coloring agents in a controlled dispersed rate. Normally the agents are fed into the system at the same rate and heated at the same rate as the base material. The unique screw of the present invention disperses and melts the agents at a different rate in order to achieve the texturing and color streaking of the present invention. The screw 120 includes different screw sections and different slopes of contact surfaces that control the rate of heating and dispersement of the agents.

[0031] The preferred embodiment of the picket 10 also includes features to provide impact strength and sturdiness. As shown in Figure 2, the picket 10 has a relatively hollow core 16. A series of spaced ribs 20, 22, 24, 26 extend longitudinally through the core 16. These ribs create a rigid structure that not only minimizes compression of the surfaces of the picket 10 but also provides torsional stability.

[0032] In use, the picket 10 is used for fencing, although it may be used in different forms for other uses, such as skirting, barricading, siding and other applications. As shown in

Figure 5, the pickets 10 are attached to rails 40 to form a section of fencing. It is to be expressly understood that other styles of fence could be created as well under the present inventive concept. The fencing section as shown in Figure 3 is intended for descriptive purposes only and not to limit the scope of the claimed invention.

[0033] In the preferred embodiment illustrated in Figures 5-9, the fencing section includes pickets 10, rails 40, 42, 44 and posts 50, 52. The posts 50, 52 are secured in bases 60, 62, such as concrete or other materials, that are mounted or formed in the ground. The posts 50, 52 may be manufactured from polyethylene coated 16 gauge galvanized steel, or from wood or any other suitable material. Post caps 54 are mounted over the tops of the posts 50, 52 to prevent moisture from collecting inside the posts as well as for providing aesthetic appeal. The post caps are formed from a resilient u/v resistant plastic material to stretch over the post and secured by a bead of silicon adhesive.

[0034] Rails 40, 42, 44 are attached to the posts 50, 52 as illustrated in Figures 6 and 7. These rails may be made from the above-described material, wood, or any other suitable material and construction. The polyethylene coated galva-

nized steel rails 40, 42, 44 include slots 46 stamped in the ends of the outer surface of the rails 40, 42, 44.

Screws 70 (shown in Figure 8) are secured through the inner surface of the rails to the posts 50, 52. The screws 70 in the preferred embodiment include self tapping threads 72 having a rubber washer 74 for sealing against the head 76 of the screw and the rail surface.

[0035] Rail caps 80 are secured over the ends of the rails 40, 42, 44 as shown in Figure 5. The rail caps 80 are formed from a resilient plastic material so that they can be either pulled back or slit for clearance over the end of the rail to allow the screws 70 to attach the rails to the posts.

[0036] The pickets 10 are attached to the rails 40, 42, 44 by screws 90 (shown in Figure 9). The screws 90 have a self tapping thread 92. The spacing of the rails is to be a maximum of 6" above and below the top and bottom rail. The screws 70 and 90 are preferably color coated to match the pickets, rails and posts.

[0037] The assembled fence section as shown in Figure 5 allows additional sections to be assembled and interconnected by the use of rails 40, 42, 44 extending from the posts to form an additional section. The use of pickets 10 provide an aesthetic look that resembles a wooden picket fence

yet does not require the maintenance of an actual wood fence.

[0038] It is to be expressly understood that the above described embodiments are not to limit the scope of the claimed inventions. Other embodiments and features are considered to be within the scope of the claimed inventions.